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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] the circuit board, for example, a dot-matrix luminescence display, for this invention to carry electrical parts, such as diode, a lamp, and a resistance element, on the matrix circuit board -- it is related with a flexible substrate and the flexible plotting board among the matrix circuit boards used when manufacturing the diode driver of the body and its function.

[0002]

[Description of the Prior Art] In this kind of matrix circuit board, the electrode pattern which consists of an anode, the cathode side wiring 4 (henceforth wiring 4) and a cathode, or anode side wiring 5 (henceforth wiring 5) is formed in the table of an insulating substrate 12, and hidden both sides as shown in drawing 3. It connects with the surface current carrying part 10 which separated in the surface electrode 9 of the electrode which considered wiring 4 formed in the rear-face side of an insulating substrate 12 as wiring 5 by the front-face side of an insulating substrate 12 through the through hole 11, and was formed. Thus, the circuit is formed by connecting the electrical parts 6, for example, a light emitting diode bare chip, such as diode and a resistance element, to the surface electrode 9 and the surface current carrying part 10 which were formed.

[0003]

[Problem(s) to be Solved by the Invention] However, by the configuration approach of this kind of matrix circuit, since wiring used as the current carrying part on a flat surface crossed, the through hole needed to be used or jumpering chip or solid wiring by the printed conductor needed to be performed, there was a problem in the dependability of that a process becomes complicated or connection etc. moreover -- since it is usually 18 micrometers or 35 micrometers as thickness of the conductor used as a circuit -- a conductor -- if resistance is strong and the circuit as a conductor becomes long, inclination will arise in supply voltage by the voltage drop, and problems, like in the result, for example, light emitting diode, a difference appears in brightness become easy to arise.

[0004] since a polyimide film and polyester film with mainly bad thermal conductivity are furthermore used as an insulating material as the circuit board for flexible through holes and a thermally conductive good metallic conductor is only the through hole section -- a conductor -- there was a trouble which the incorrect actuation on a circuit etc. generates that it is easy to accumulate generation of heat from electrical parts, such as a circuit, carried diode, and a resistance element.

[0005]

[Means for Solving the Problem] As a result of examining many things as an approach for solving these problems, this invention by carrying out solid wiring to the shape of a mesh various in the condition that the metallic conductor line by which linearity has a thin flexible property was insulated beforehand If a thermally conductive good bulking agent is included in the resin used as an insulating agent which can be made to form a circuit on one [at least] flat surface, and fixes mesh-like solid wiring, heat dissipation nature is good. It came to complete header this invention for emitting the heat generated from an electrical part or a metallic conductor line circuit to whether you are Sumiya.

[0006] That is, this invention carries out mutual mesh-like solid wiring at least, where a metallic conductor line with a diameter of 0.2mm or less is insulated beforehand, and it is characterized by the plotting board which comes to carry light emitting diode in the functional part or the matrix circuit board which has the matrix circuit which comes to carry electrical parts, such as diode, a lamp, and a resistance element, in the desired flexible matrix circuit board to which remove an insulating part and it makes it come to expose a metallic conductor line and this desired matrix circuit board.

[0007]

[Function and Example(s)] A drawing explains this invention to a detail below. (1) of drawing 1 is the perspective view of the plain-weave mesh-like solid wiring 2 which wove by turns the pre-insulation metallic conductor line 1 covered with the insulating material of this invention as warp and the weft, and (2) is a top view showing the wiring 4 which consists of a pre-insulation metallic conductor line 1 exposed when the plain-weave mesh-like solid wiring 2 is seen at a flat surface, and wiring 5.

[0008] Moreover, (1) of drawing 2 sinks in the insulating agent 3, and it uses the clearance between the plain-weave mesh-like solid wiring 2 as the circuit board. When it sees to the shape of a mesh at the flat surface of the pre-insulation metallic conductor line 1 by which solid wiring was carried out, grind the insulating part in which the electrical part of the wiring 4 exposed to a front face and wiring 5 etc. is carried, and a metallic conductor line is exposed. It is the side-face

sectional view of the bonding pad 8 which pasted up the monochrome light emitting diode bare chip 6 on wiring 4 through solder, and was prepared in wiring 5, and the plotting board connected with the wire 7.

[0009] As a metallic conductor line used for the pre-insulation metallic conductor line 1 of this invention, when a wire size is thin, if it is an object with small electric resistance, although the quality of the material is carried out and there is no limit in any way, copper wire is suitable [from the point of electric resistance and a price] by having flexible nature. And as a wire size of a metallic conductor line, in order to maintain flexible nature, it is necessary to make it 0.2mm or less.

[0010] Moreover, resin, such as polyurethane, polyethylene, polypropylene, a formal, and ethylene tetrafluoride, is [that what is necessary is just the quality of the material which has the flexibility which can be woven in the shape of a mesh by turns at least as a pre-insulation ingredient] usable.

[0011] The weave of mesh-like solid wiring of this invention can change weave by the helicopter loading site of electrical parts, such as diode on a plain weave, twill, and other circuits, and a resistor, and can also form mesh-like solid wiring. And in case they may differ even if the metallic conductor line used as warp and the weft has the same wire size, and they are woven further, even if it is a metallic conductor line about one side and is in any of whether another side is made into a pre-insulation metallic conductor line, or to make both into a pre-insulation metallic conductor line, it does not interfere.

[0012] since [next,] the plain-weave mesh-like solid wiring 2 used for this invention is supple -- as reinforcement -- moreover, electrical parts and conductors, such as diode and a resistance element, -- when generation of heat from a circuit becomes a problem, the resin which filled up the clearance between mesh-like solid wiring with the thermally conductive good filler as an insulating agent 3 is slushed, and it solidifies -- making -- existing filler restoration resin -- an electrical-part metallurgy group -- a conductor -- heat dissipation from a line circuit performs efficiently

[0013] Although imide resin with flexible nature, polyester, silicone resin, etc. are desirable as resin used as an insulating agent 3, liquefied thermosetting resin, engineer plastics thermoplastics, etc., such as epoxy and a phenol, are used. Moreover, if it is a thermally conductive good object as a filler, there is especially no limit and impalpable powder, such as an aluminum oxide (alumina), aluminum nitride, boron nitride, silicon nitride, oxidization silicon, and cordierite, is used.

[0014] An electrical part can be attached in the part of the metallic conductor line which this invention exposed at the easy process of applying for example, a pewter paste, laying electrical parts, such as diode and a resistance element, and performing a pewter reflow. In order to raise pewter adhesion at this time, nickel plating, gold plate, etc. may be processed for the corrosion prevention of a metallic conductor line. As a bonding pad 8 prepared in wiring 5 further, for example, gold plate, coppering, and nickel plating are used.

[0015] Moreover, although a support plate may be used for this invention through the insulating agent 3, in case aluminum, silicon steel, carbon steel, SUS, Invar, etc. are used in case heat-conduction effectiveness is gathered, and it seldom needs thermal conductivity, it does not interfere with resin plates, such as phenol resin, imide resin, and an epoxy resin,, either.

[0016] When the matrix circuit board of this invention is seen at the flat surface of a plain weave or mesh-like solid wiring which carried out twill, expose it. Can produce by grinding the insulating material of the metallic conductor line by which the location of a request of one side or both sides is not insulated, and a pre-insulation metallic conductor line, and exposing a metallic conductor line, and Moreover, a metallic conductor line can produce both by grinding the insulating material of a desired location and exposing a metallic conductor line, when covered with the insulating material.

[0017] And this circuit board can be reinforced by infiltrating a resin-like object into the clearance between mesh-like solid wiring as occasion demands, and can produce the substrate which can be used for applications various by sticking a support plate in this case.

[0018] thus, the thing which this invention can manufacture the flexible matrix circuit board easily by using various mesh-like solid wiring, moreover becomes stable [the supply voltage to a metallic conductor line or an electrical part], and is sunk [clearance / between mesh-like solid wiring] in in an insulating agent with good thermal conductivity -- electrical-part metallurgy groups, such as diode, a resistance element, and a lamp, -- a conductor -- good production of the very reliable matrix circuit board can also perform heat dissipation nature from a line circuit easily.

[0019] Since the part made into the purpose of the carried functional part as operation using these descriptions of the matrix circuit board of this invention can be made to drive statically or dynamically, if light emitting diode and a lamp are carried, for example, it can be used as a display board, and if a resistance element is carried, it can be used as a board circuit for printing to a thermal paper.

[0020] Furthermore, an example explains this invention concretely.

Copper wire with a diameter of 0.1mm was covered with example 1 polyurethane resin, and the pre-insulation metallic conductor line 1 was made, and this pre-insulation metallic conductor line 1 was woven in the shape of a mesh at intervals of 1mm, it considered as the plain-weave mesh-like solid wiring 2, then, polyimide resin was slushed and stiffened as an insulating agent 3 to extent which the solid wiring intersection section front face of the pre-insulation metallic conductor line 1 exposes, and the substrate was produced. It is 300 to a part as nothing as wiring 4 and wiring 5, and required of the copper wire ground and exposed until copper wire exposed with abrasives the pre-insulation metallic conductor line 1 exposed to a front face using this substrate. The light emitting diode bare chip 6 of mum was connected with soldering and a wire 7, and the light emitting diode (it is called Following LED) plotting board was produced.

[0021] Except having used without covering one copper wire of the example 2 plain-weave mesh-like solid wiring 2, the same actuation as an example 1 was performed, and the LED plotting board was produced.

[0022] Cover copper wire with a diameter of 0.1mm with example 3 polyethylene resin, and the pre-insulation metallic conductor line 1 is made. Weave a line 1 in the shape of a mesh at intervals of 0.5mm, and the substrate of the plain-

weave mesh-like solid wiring 2 is produced. this conductor -- The functional part which carries diode, a resistance element, etc. in the required part of the copper wire ground and exposed, and has a matrix circuit was produced until copper wire exposed with abrasives the pre-insulation metallic conductor line 1 of one side exposed to a front face using this substrate.

[0023]
[Effect of the Invention] The thing which it is cheap as a matrix circuit for LED display boards for example, since it can make easily, without the flexible matrix circuit board preparing a through hole etc. according to this invention as the above, and this circuit board moreover has good heat dissipation nature and electric resistance is also small, and the variation in brightness is small, and obtain a display board with heat dissipation nature good moreover and which things can be carried out and is used as a board circuit for printing is also possible.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] (1) of drawing 1 is the perspective view of plain-weave mesh-like solid wiring which wove the pre-insulation metallic conductor line by turns, and (2) is a top view showing wiring which consists of each of the pre-insulation metallic conductor line exposed when plain-weave mesh-like solid wiring is seen at a flat surface.

[Drawing 2] (1) of drawing 2 expresses the side-face sectional view of the plotting board which pasted up the monochrome light emitting diode bare chip on wiring to mesh-like solid wiring. Moreover, (2) expresses with the plotting board of the above (1) the side-face sectional view in which the support plate was formed.

[Drawing 3] Drawing 3 is a side-face sectional view showing the conventional plotting board.

[Description of Notations]

- 1 Pre-insulation Metallic Conductor Line
- 2 Plain-Weave Mesh-like Solid Wiring
- 3 Insulating Agent
- 4 Wiring
- 5 Wiring
- 6 Light Emitting Diode Bare Chip
- 7 Wire
- 8 Bonding Pad
- 9 Surface Electrode
- 10 Surface Current Carrying Part
- 11 Through Hole
- 12 Insulating Substrate
- 13 Support Plate

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CLAIMS

[Claim(s)]

[Claim 1] The flexible matrix circuit board to which carry out mutual mesh-like solid wiring at least where a metallic conductor line with a diameter of 0.2mm or less is insulated beforehand, and remove a desired insulating part, and it makes it come to expose a metallic conductor line.

[Claim 2] The flexible matrix circuit board according to claim 1 which makes resin come to sink into mutual mesh-like solid wiring.

[Claim 3] The functional part which has the flexible matrix circuit which comes to carry electrical parts, such as diode, a lamp, or a resistance element, in the flexible matrix circuit board according to claim 1 or 2.

[Claim 4] The plotting board which comes to carry light emitting diode in the flexible matrix circuit board according to claim 1 or 2.

[Translation done.]

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TITLE: Flexible matrix circuit board - has insulated
metal

conductor laid in alternative-mesh two layer wiring,
desired portion of which is exposed by removing
insulator. NoAbstract

PATENT-ASSIGNEE: DENKI KAGAKU KOGYO KK[ELED]

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METAL CONDUCTOR LAY

ALTERNATIVE MESH TWO LAYER WIRE PORTION EXPOSE
REMOVE INSULATE

NOABSTRACT

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DISPLAY BOARD

PUBN-DATE: March 26, 1993

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APPL-NO: JP03262591

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ABSTRACT:

PURPOSE: To speedily radiate heat generated by electric components and a metallic conductor circuit by wiring thin and flexible metallic conductors in

three dimensions and in various mesh shapes while insulating them in advance.

CONSTITUTION: The metallic conductors of $\leq 0.2\text{mm}$ in diameter while

previously insulated are wired in three dimensions and in at least a crossing

mesh shape and desired insulation parts are removed to expose the metallic

conductors, constituting the flexible matrix circuit board. Further, a

function component is constituted having a matrix circuit constituted by

mounting the electric components such as a diode and a resistance element on

the matrix circuit board. Gaps between, for example, plane woven mesh

three-dimensional electric conductors 2 are impregnated with an insulating

agent 3 to form a circuit board and on the plane of an insulating

coating metal

conductors wired in three dimensions and in the mesh shape, an

insulation part

of the electric conductors 4 and 5, exposed on the surface, where the

electronic components, etc., are mounted is polished to expose the

metallic

conductors; and the electric conductor 4 is provided with a

monochromatic light

emission diode chip 6, the electric conductor 5 is provided with a

bonding wire

8, and they are connected by a wire 7 to constitute the display board.

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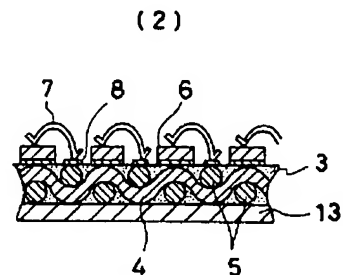
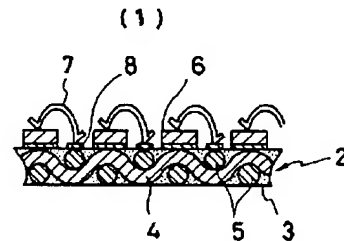
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(54)【発明の名称】 フレキシブルマトリックス回路基板及び表示板

(57)【要約】

【目的】 線形が細くフレキシブルな特性を有する金属導体線を用いてスルホールのない回路を形成して電気部品や金属導体線回路から発生する熱を速やかに放出する。

【構成】 直径が0.2mm以下の金属導体線を予め絶縁された状態で交互網目状立体配線して所望の絶縁部分を除去して金属導体線を露出させる。



【特許請求の範囲】

【請求項1】 直径0.2mm以下の金属導体線が予め絶縁された状態で少なくとも交互網目状立体配線して所望の絶縁部分を除去して金属導体線を露出させてなるフレキシブルマトリックス回路基板。

【請求項2】 交互網目状立体配線に樹脂を含浸させてなる請求項1記載のフレキシブルマトリックス回路基板。

【請求項3】 請求項1又は請求項2記載のフレキシブルマトリックス回路基板にダイオード、ランプ又は抵抗素子等の電気部品を搭載してなるフレキシブルマトリックス回路を有する機能部品。

【請求項4】 請求項1又は請求項2記載のフレキシブルマトリックス回路基板に発光ダイオードを搭載してなる表示板。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明はマトリックス回路基板上にダイオード、ランプ及び抵抗素子などの電気部品を搭載するための回路基板、例えばドットマトリックス発光表示体用のダイオードドライバを製造する場合に使用されるマトリックス回路基板のうちフレキシブルな基板及び表示板に関する。

【0002】

【従来の技術】この種のマトリックス回路基板においては、図3に示すとおり絶縁基板12の表と裏の両面にアノードまたはカソード側配線4（以下配線4という）とカソードまたはアノード側配線5（以下配線5という）からなる電極パターンを形成し、絶縁基板12の裏面側に形成された配線4をスルーホール11を介して絶縁基板12の表面側で配線5とした電極の表面電極9とは分離して形成した表面導電部10に接続し、このようにして形成した表面電極9と表面導電部10とにダイオード及び抵抗素子等の電気部品、例えば発光ダイオードベアチップ6を接続することにより回路を形成している。

【0003】

【発明が解決しようとする課題】しかし、この種のマトリックス回路の構成方法では、平面上での導電部となる配線が交差するために、スルーホールを用いるかジャンパーチップあるいは印刷導体による立体配線を行う必要があるため、工程が複雑になるばかりか接続の信頼性等に問題があった。また回路として用いられる導体の厚みとしては通常18μm若しくは35μmなので導体抵抗が大きく、導体としての回路が長くなると電圧降下により供給電圧に勾配が生じ、その結果例えば発光ダイオードにおいては輝度に差が出るなどの問題が起こり易くなる。

【0004】さらにフレキシブルスルーホール用回路基板としては、絶縁材料として主に熱伝導性が悪いポリイミドフィルムやポリエステルフィルムが用いられ、熱伝

導性の良い金属導体はスルーホール部だけなので、導体回路や搭載したダイオードや抵抗素子等の電気部品からの発熱が蓄積しやすく回路上での誤作動などが発生する問題点があった。

【0005】

【課題を解決するための手段】本発明は、これらの問題を解決するための方法として種々検討した結果、線形が細くフレキシブルな特性を有する金属導体線を予め絶縁された状態で種々の網目状に立体配線することにより、少なくとも一方の平面上で回路を形成させることができ、また網目状立体配線を固定化する絶縁剤として使用する樹脂中に熱伝導性の良い充填剤を含ませれば放熱性がよく、電気部品や金属導体線回路から発生する熱をすみやかに放出することを見出し本発明を完成するに至った。

【0006】すなわち本発明は、直径0.2mm以下の金属導体線が予め絶縁された状態で少なくとも交互網目状立体配線して所望の絶縁部分を除去して金属導体線を露出させてなるフレキシブルマトリックス回路基板、また該マトリックス回路基板にダイオード、ランプ及び抵抗素子等の電気部品を搭載してなるマトリックス回路を有する機能部品又はマトリックス回路基板に発光ダイオードを搭載してなる表示板を特徴とするものである。

【0007】

【作用及び実施例】以下図面により本発明を詳細に説明する。図1の(1)は、本発明の絶縁材料で被覆された絶縁被覆金属導体線1を縦糸と横糸として交互に織った平織り網目状立体配線2の斜視図であり、(2)は、平織り網目状立体配線2を平面で見た際に露出される絶縁被覆金属導体線1からなる配線4と配線5を表わす平面図である。

【0008】また図2の(1)は、平織り網目状立体配線2の隙間を絶縁剤3を含浸して回路基板とし、網目状に立体配線された絶縁被覆金属導体線1の平面で見た際に、表面に露出される配線4と配線5の電気部品等を搭載する絶縁部分を研磨して金属導体線を露出させ、配線4に半田を介して単色発光ダイオードベアチップ6を接着し、配線5に設けたボンディングパッド8とワイヤー7で結線した表示板の側面断面図である。

【0009】本発明の絶縁被覆金属導体線1に用いる金属導体線としては、線径が細い時にフレキシブル性を有し電気抵抗の小さい物なら材質して何ら制限はないが、電気抵抗及び価格の点から銅線が適している。そして金属導体線の線径としては、フレキシブル性を維持する為には0.2mm以下にする必要がある。

【0010】また絶縁被覆材料としては、少なくとも交互に網目状に織ることのできる柔軟性を有する材質であればよく、ポリウレタン、ポリエチレン、ポリプロピレン、ホルマール及び4フッ化エチレンなどの樹脂が使用可能である。

【0011】本発明の網目状立体配線の織り方は、平織り、綾織り及びその他回路上のダイオード及び抵抗素等の電気部品の搭載位置により織り方を変えて網目状立体配線を形成することもできる。そして縦糸と横糸として用いる金属導体線は、線径が同一でも異なってもよく、さらに織る際に一方を金属導体線で、他方を絶縁被覆金属導体線とするか、又は両方を絶縁被覆金属導体線とするかのいずれかであっても差支えない。

【0012】次に本発明に用いる平織り網目状立体配線2は柔軟性があるため補強として、またダイオード及び抵抗素等の電気部品や導体回路からの発熱が問題になる時は、網目状立体配線の隙間に絶縁剤3として熱伝導性のよいフィラーを充填した樹脂を流し込み固化させて、既フィラー充填樹脂により電気部品や金属導体線回路からの放熱を効率よく行うことができる。

【0013】絶縁剤3として用いる樹脂としては、フレキシブル性のあるイミド樹脂、ポリエステル及びシリコーン樹脂などが好ましいが、エポキシ及びフェノール等の液状熱硬化性樹脂やエンジニアプラスチック熱可塑性樹脂なども用いられる。またフィラーとしては、熱伝導性の良い物なら特に制限はなく、酸化アルミニウム（アルミナ）、窒化アルミニウム、窒化硼素、窒化珪素、酸化珪素及びコーゼライト等の微粉末が用いられる。

【0014】本発明の露出した金属導体線の部分には、例えばハンダペーストを塗布してダイオード及び抵抗素等の電気部品を載置してハンダリフローを行うという簡単な工程で電気部品の取り付けが行える。この時ハンダ付着性を上げるため又は金属導体線の腐食防止のためにニッケルメッキ、金メッキなどの処理を行っても良い。さらに例えば配線5に設けるボンディングパッド8としては、金メッキ、銅メッキ及びニッケルメッキが使用される。

【0015】また本発明は、絶縁剤3を介して支持板を使用してもよいが、熱伝導効率をあげる際には、例えばアルミニウム、珪素鋼、炭素鋼、SUS及びインバー等が用いられ、また熱伝導性をあまり必要としない際にはフェノール樹脂、イミド樹脂及びエポキシ樹脂等の樹脂板でも差支えない。

【0016】本発明のマトリックス回路基板は、例えば平織り又は綾織りした網目状立体配線の平面で見た際に露出する、片面又は両面の所望の位置の絶縁されていない金属導体線及び絶縁被覆金属導体線の絶縁材料を研磨して金属導体線を露出させることにより作製することができるし、また金属導体線が両方とも絶縁材料で被覆されている際は、所望の位置の絶縁材料を研磨して金属導体線を露出させることにより作製することができる。

【0017】そしてこの回路基板は、必要により網目状立体配線の隙間に樹脂状物を含浸させることにより補強できるし、この際支持板を貼着することで種々の用途に

使用できる基板を作製することができる。

【0018】このように本発明は、種々の網目状立体配線を用いることによりフレキシブルマトリックス回路基板の製造が簡単に行え、しかも金属導体線や電気部品への供給電圧が安定となり、網目状立体配線の隙間を熱伝導性良好な絶縁剤を含浸することによりダイオード、抵抗素及びランプ等の電気部品や金属導体線回路からの放熱性もよい、極めて信頼性の高いマトリックス回路基板の作製が容易に行うことができる。

【0019】これらの特徴を利用した本発明のマトリックス回路基板の使用方法としては、搭載した機能部品の目的とする部分をスタティック又はダイナミックにドライブさせる事ができるので、例えば発光ダイオードやランプを搭載すれば表示板として使用でき、抵抗素を搭載すれば感熱紙への印字用ボード回路として使用することができる。

【0020】さらに実施例により本発明を具体的に説明する。

実施例1

20 ポリウレタン樹脂で直径0.1mmの銅線を被覆して絶縁被覆金属導体線1を作り、この絶縁被覆金属導体線1を1mm間隔で網目状に織って平織り網目状立体配線2とし、次に絶縁剤3としてポリイミド樹脂を絶縁被覆金属導体線1の立体配線交点部表面が露出する程度まで流し込み硬化させ基板を作製した。この基板を用いて表面に露出している絶縁被覆金属導体線1を研磨材で銅線が露出するまで研磨して露出した銅線で配線4及び配線5となし、必要な部分に300μmの発光ダイオードベアチップ6を半田付け及びワイヤー7で接続して発光ダイオード（以下LEDという）表示板を作製した。

【0021】実施例2

平織り網目状立体配線2の一方の銅線を被覆しないで用いた以外は、実施例1と同様な操作を行いLED表示板を作製した。

【0022】実施例3

40 ポリエチレン樹脂で直径0.1mmの銅線を被覆して絶縁被覆金属導体線1を作り、この導体線1を0.5mm間隔で網目状に織って平織り網目状立体配線2の基板を作製し、この基板を用いて表面に露出している片面の絶縁被覆金属導体線1を研磨材で銅線が露出するまで研磨して露出した銅線の必要な部分にダイオードや抵抗素等を搭載してマトリックス回路を有する機能部品を作製した。

【0023】

【発明の効果】以上とおり本発明によればフレキシブルマトリックス回路基板は、スルーホール等を設けることなく容易に作ることができ、しかも該回路基板は放熱性が良好で、また電気抵抗も小さいので、例えばLED表示板用のマトリックス回路として、安価で輝度のバラツキが小さく、しかも放熱性が良好な表示板を得ることで

きるし、印字用ボード回路として使用することも可能である。

【図面の簡単な説明】

【図1】図1の(1)は、絶縁被覆金属導体線を交互に織った平織り網目状立体配線の斜視図であり、(2)は、平織り網目状立体配線を平面で見た際に露出される絶縁被覆金属導体線の各々からなる配線を表わす平面図である。

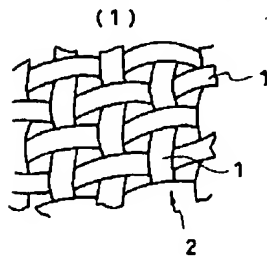
【図2】図2の(1)は、網目状立体配線に単色発光ダイオードペアチップを配線に接着した表示板の側面断面図を表わすものである。また(2)は、前記(1)の表示板に支持板を設けた側面断面図を表わすものである。

【図3】図3は、従来の表示板を表わす側面断面図である。

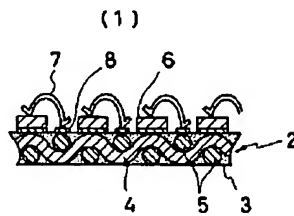
【符号の説明】

- 1 絶縁被覆金属導体線
- 2 平織り網目状立体配線
- 3 絶縁剤
- 4 配線
- 5 配線
- 6 発光ダイオードペアチップ
- 7 ワイヤ
- 8 ボンディングパッド
- 9 表面電極
- 10 表面導電部
- 11 スルーホール
- 12 絶縁基板
- 13 支持板

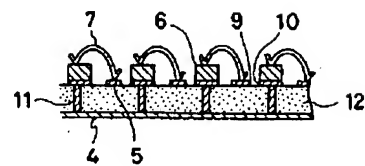
【図1】



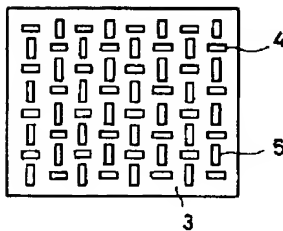
【図2】



【図3】



(2)



(2)

